

ABB Automation & Power World: April 18-21, 2011

Allen Austin - Solar Segment Manager North America, Low Voltage Products

WLP-123-1-CEU

Solar applications for low voltage products

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Solar applications for low voltage products

- Speaker name: Allen Austin
- Speaker title: Solar Segment Manager North America
Low Voltage Products
- Company name: ABB Inc
- Location: Atlanta, Georgia

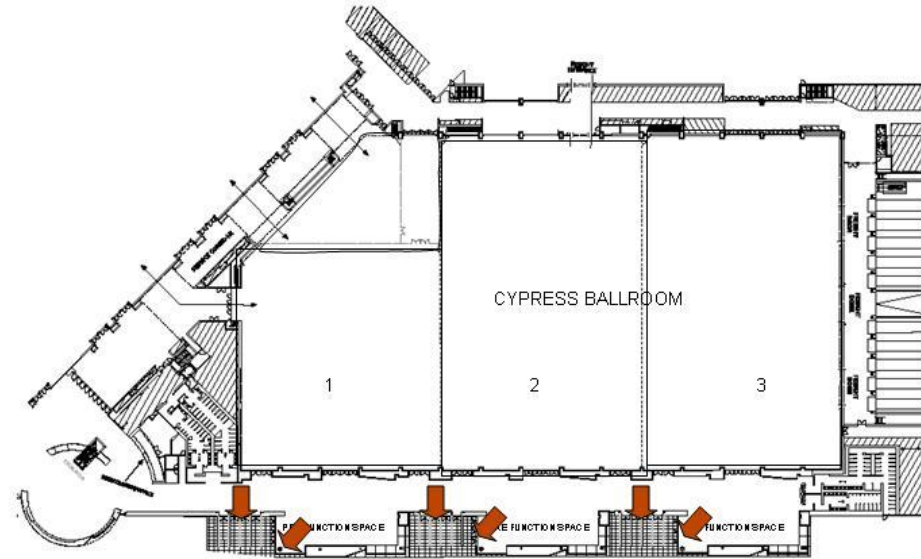
Your safety is important to us

Please be aware of these emergency procedures

- In the event of an emergency please dial ext. 55555 from any house phone. Do not dial 9-1-1.
- In the event of an alarm, please proceed carefully to the nearest exit. Emergency exits are clearly marked throughout the hotel and convention center.
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Your safety is important to us

Convention Center exits in case of an emergency



Know your surroundings:

- We are now in the “New York” meeting room
- Noted in the bottom left of the map
- Our nearest exit is via the courtyard terrace

Solar applications for low voltage products

Learning objectives

Solar Power defined

Understanding the basics of Solar Thermal Power & utilized equipment

Understanding the basics of Solar Photovoltaic Power & utilized equipment

Define ABB's offering for Solar Power applications

Summary review – Q&A

Solar applications for low voltage products

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- **Solar Power defined**

- **Solar Thermal Power(STP) –**

- Type 1. Converts sun energy into heat via reflective materials used to make steam to drive steam or heat engines that produces electricity. Mostly utility scale applications.

- Type 2. Solar thermal panels use sun rays to heat a special fluid that releases the heat to a water tank through a forced circulation heat exchanger. Mostly residential and commercial applications.

- **Photovoltaic Power(PV) –**

- Converts sun energy into electricity with no moving parts. Properly treated silica based semi-conductive materials known as solar panels convert solar radiation into direct current(DC) electricity.

Solar applications for low voltage products

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The basics of thermal power plants



Solar Thermal Power Plants (scaleable from 10 to 500MW)

- Solar thermal electric energy generation concentrates the light from the sun to create heat in a stored fluid. The heat from the fluid is used to run a heat engine, which turns a generator to make electricity.
- The working fluid that is heated by the concentrated sunlight can be a liquid or a gas
 - Different working fluids include water, oil, salts, air, nitrogen, helium, etc.
- Different engine types include: steam engines, gas turbines, Stirling engines, etc.
- All of these engines can be quite efficient, often between 25% and 50%, and are capable of producing 10's to 100's of megawatts of power.



Solar applications for low voltage products

Solar Power defined

Understanding the basics of Solar Thermal Power & utilized equipment

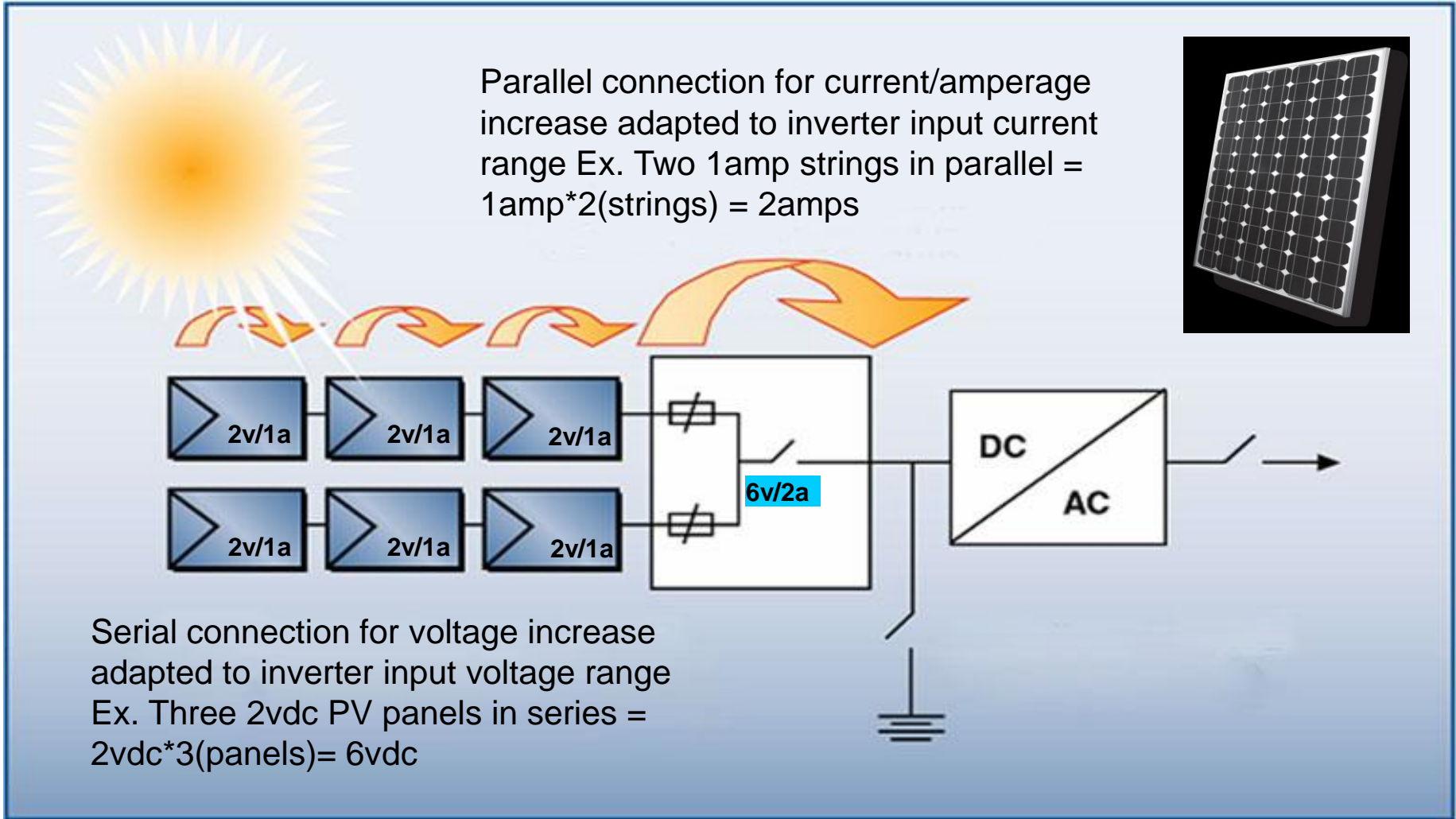
Understanding the basics of Solar Photovoltaic Power & utilized equipment

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Solar applications for low voltage products

Standard PV power generation



Solar modules connection

Solar applications for low voltage products

PV solar power types



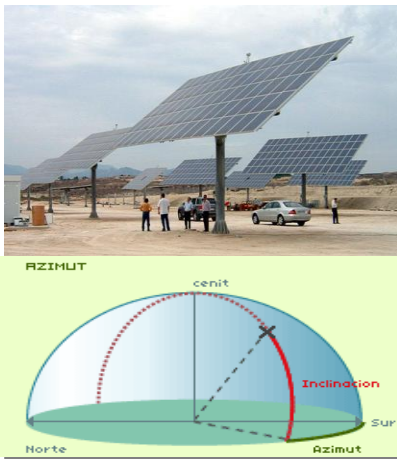
PV roof installation

- Residential and Commercial applications
- Low / medium power photovoltaic installation in a fixed structure
- Fixed structures, solar panels, inverters, switchgear, low voltage controls & protection cabinets, automation and transformer.
- Typical power (**10 Kw to 500 Kw**).



PV ground plant installation (Fixed structure)

- Medium / high power standard photovoltaic installation in a fixed structure.
- Fixed structures, solar panels, inverters, switchgear, low voltage & protection cabinets, pre-built transformation center, security, automation, transformer, cabling and small civil work
- Typical power (**100 Kw to 250 Mw**).



PV ground plant installation (1 or 2 axis trackers)

- Medium / high power photovoltaic installation in a 1 or 2 axis structure.
- 1 or 2 axis structures (multiple or single pole), robots, motors, drives, solar panels, inverters, switchgear, low voltage & protection cabinets, pre-built transformation center, security, automation, transformer, cabling, substations and small civil work)
- Typical power (**100 Kw to 250 Mw**).

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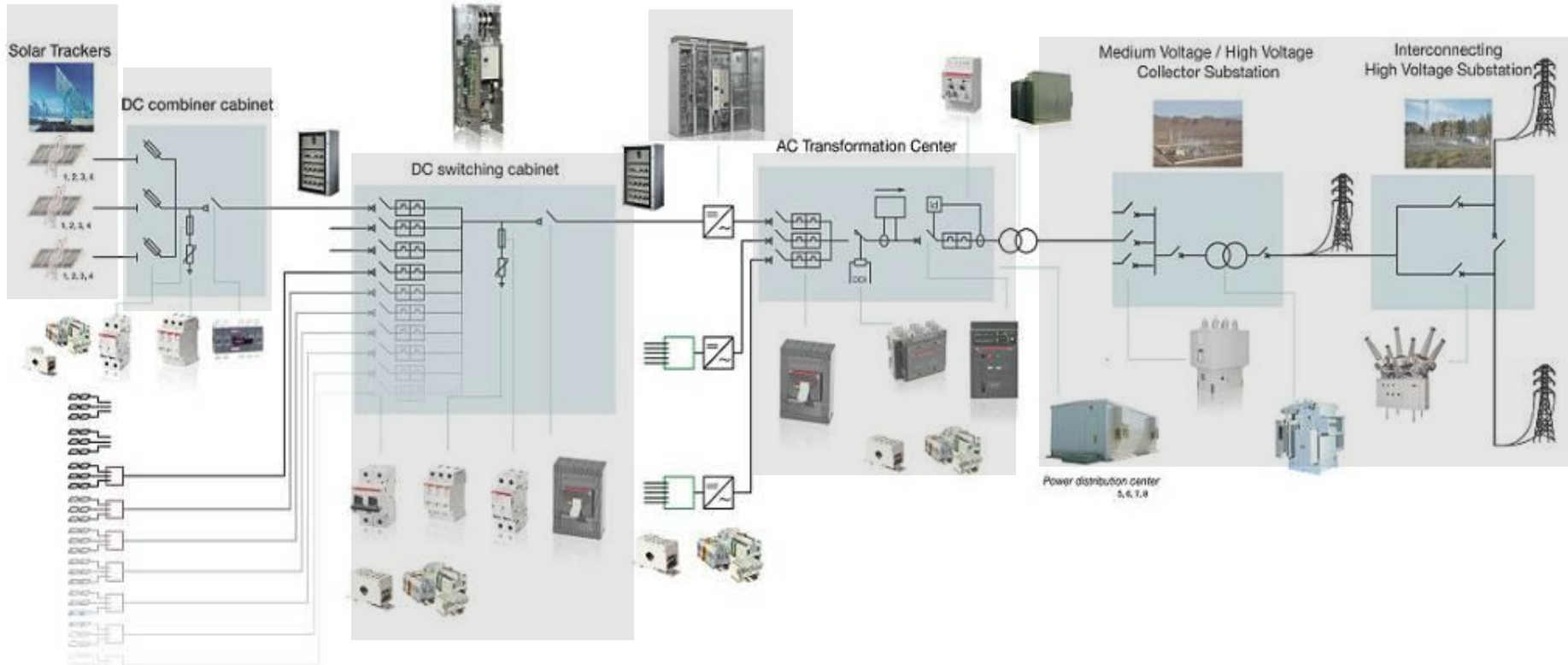
Summary review – Q&A

ABB low voltage products for solar PV applications

- Fuse holders
- Terminal blocks
- Mini breakers
- Power distribution blocks
- Switches

- Surge protectors
- Molded case breakers
- DC power supplies
- DC contactors
- Ground fault detectors

Overall system control



Fuse holders and fuse disconnectors

Designed for string protection and switching under load for use in combiner boxes E90PV

Connection devices

New industrial modular fuse holders for 10x38 mm and Class CC fuse

ABB is pleased to announce the launch of its new line of modular fuse holders in addition to the existing line of fuse terminal blocks..

The new range of modular fuse holders provides:

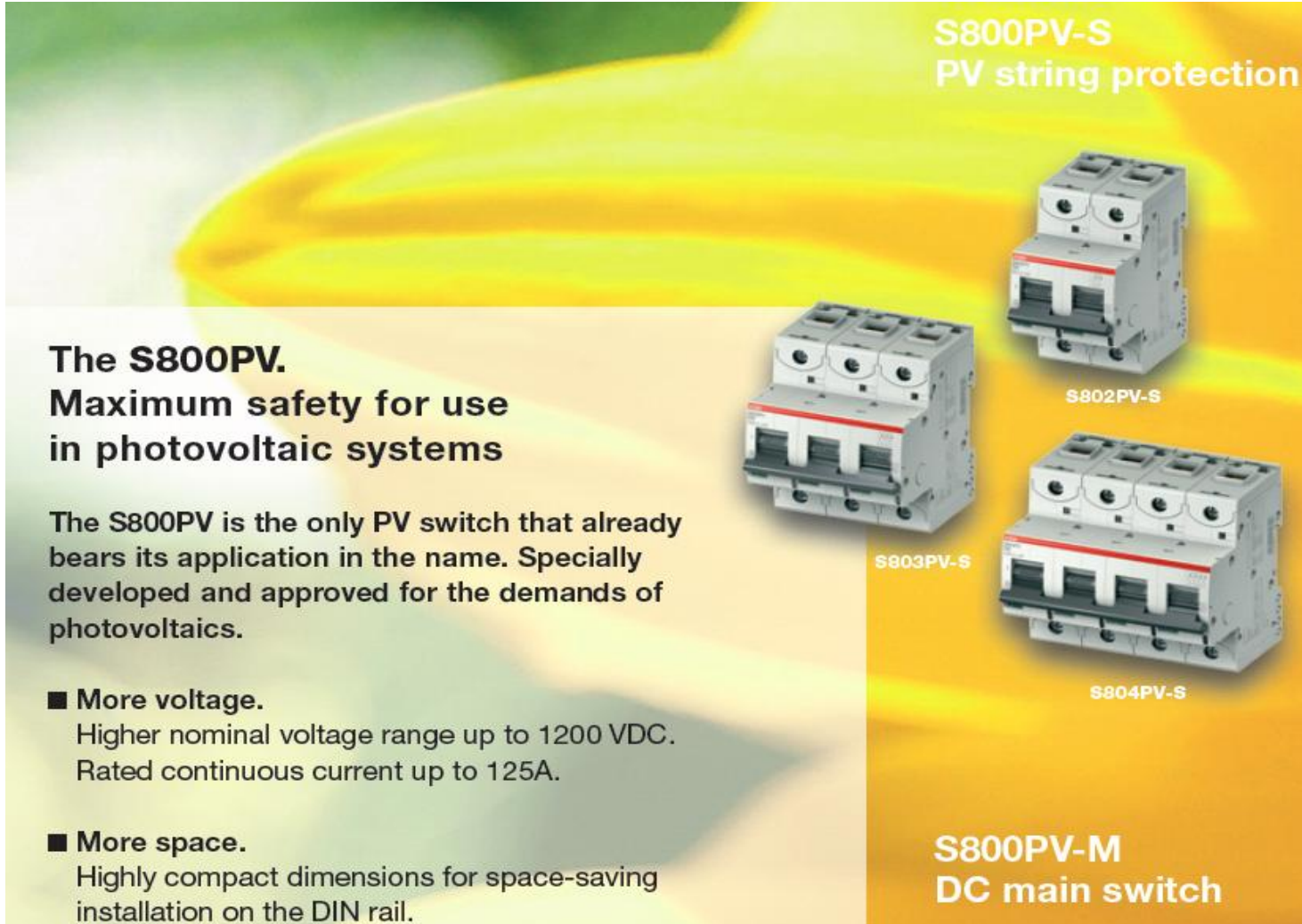
- safe operation,
- fast and simple multiple pole assembly
- quick fuse installation and replacement
- blown fuse indicator for quick identification of fuse failures.

The Class CC fuse versions are rejection style with high breaking capacity (200 KA).

Modular fuse holders provide a wide fuse contact surface and have electrolytic silver plated copper contacts to ensure minimal contact resistance and reliable operation. The insulation material is UL94 V0.



Miniature circuit breaker and molded case switch Maximum safety for use in PV systems (IEC rated) for use in combiner box applications to 125amps



S800PV-S
PV string protection

The S800PV.
Maximum safety for use
in photovoltaic systems

The S800PV is the only PV switch that already bears its application in the name. Specially developed and approved for the demands of photovoltaics.

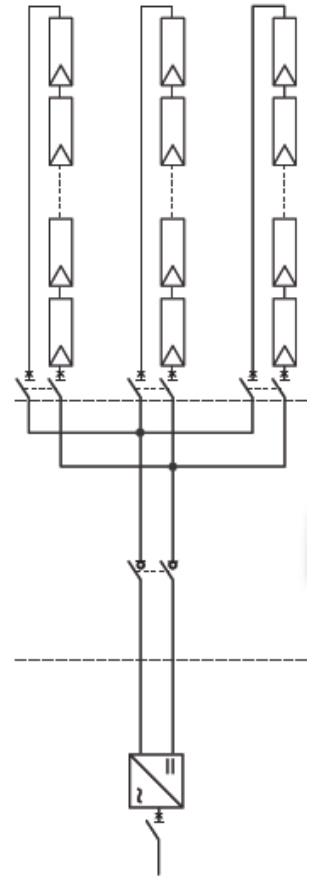
- **More voltage.**
Higher nominal voltage range up to 1200 VDC.
Rated continuous current up to 125A.
- **More space.**
Highly compact dimensions for space-saving installation on the DIN rail.

S802PV-S

S803PV-S

S804PV-S

S800PV-M
DC main switch



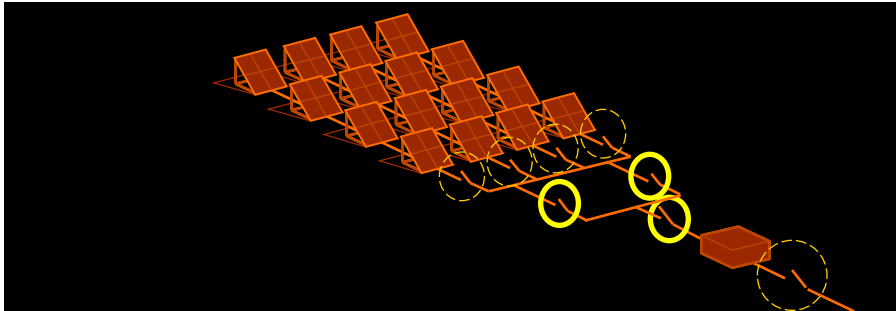
ABB's Disconnect Switch Offering OT switch-disconnectors (UL or IEC) for use in combiners and re-combiners. 600vdc- 1000vdc



- Series-connected poles for increased DC breaking capacity
- OT models for DC applications:
 - OT28...OT200 up to 600 V UL
 - OT16...40F8, OT160E4 up to 750 V IEC
 - OT16F8, OT200...630E23 up to 800 V IEC
 - OT200...630E33 up to 1000 V IEC

Tmax for Solar Application.

The new Molded Case Switch-Disconnecter range up to 1100 V DC for use in re-combiners

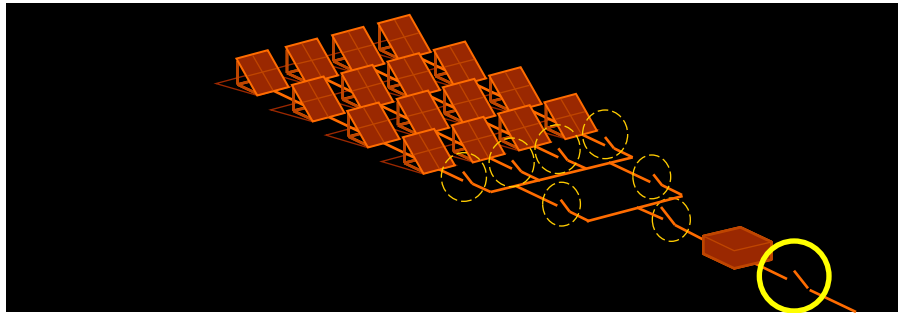


- The first dedicated Molded Case Switch Disconnecter range for **the PV segment**.
- Tested according to **IEC 60947-3 Standard**
- Tested according to **UL 489 Standard**.
- IEC rated service voltage up to **1100VDC 1600A**
- UL rated service voltage up to **600VDC 800A**
- 6 different sizes: from the compact T1 (which can be mounted on DIN rail) to the high-performance T7, available in the two versions, with lever operating mechanism and motor operator.
- Complete **remote control available**



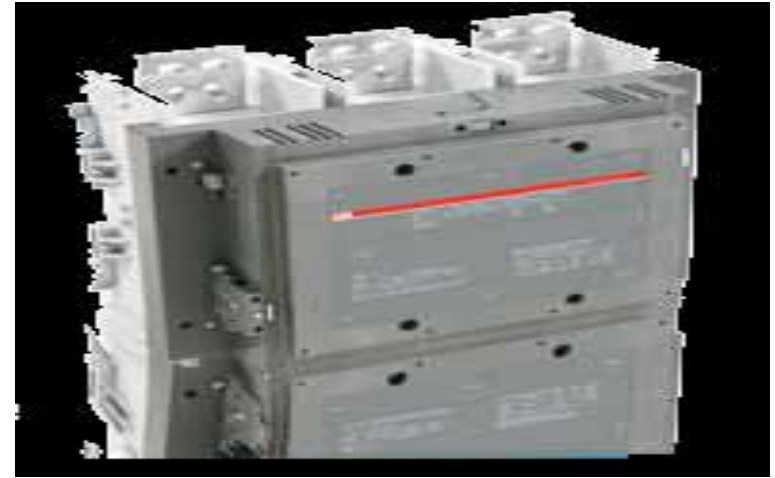
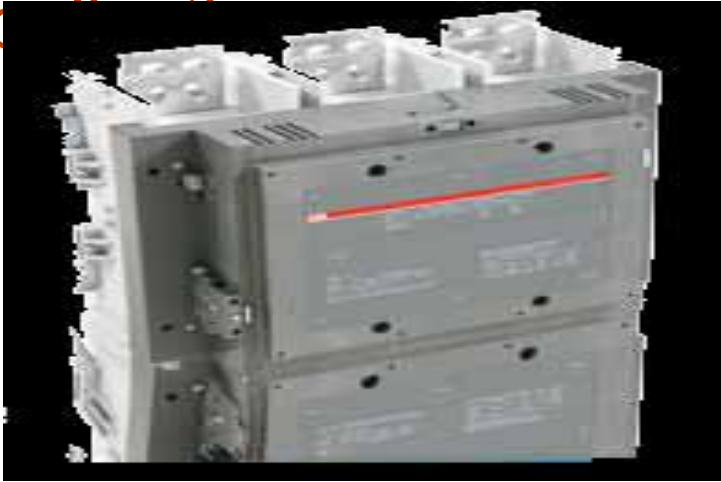
Moulded Case Circuit Breakers

Tmax for DC and AC protection and isolation
for use in protection panels and inverter units



- Used on AC side of photovoltaic applications eg. inverter switchgear
- Used on DC side for re-combiner isolation and protection
- **Both UL and IEC standards**
- Rated UL AC up to 600vac 5000A
- Rated IEC AC up to 1150vac 5000A
- Rated UL DC up to 600vdc, 800A
- Rated IEC DC up to 1000vdc, 5000A
- Breaking capacity up to 200 KA
- Magnetic only, Thermomagnetic or advanced Electronic releases
- Residual current protection
- Remote control available for all the sizes
- Wide range of electrical and mechanical accessories
- Fixed, plug-in, withdrawable executions
- Connection terminals for all the installations

ABB's Larger DC Contactor Offering AF400 to AF2050 UL 600VDC and IEC 850VDC Soon 1000VDC for use in large inverter **controlled** switching ap



UL (cULus)

Contactor	Current rating ¹⁾	Voltage	Status
AF185	250 A	240 V DC	Ready to order
AF400	550 A	600 V DC	Ready to order
AF460	650 A	600 V DC	Ready to order
AF580	750 A	600 V DC	Ready to order
AF750	900 A	600 V DC	Ready to order
AF1250	1210 A	600 V DC	Ready to order
AF1350	1350 A	600 V DC	Ready to order
AF1650	1650 A	600 V DC	Ready to order
AF2050	2050 A	600 V DC	Ready to order

1) Current rating with three poles connected in series

IEC

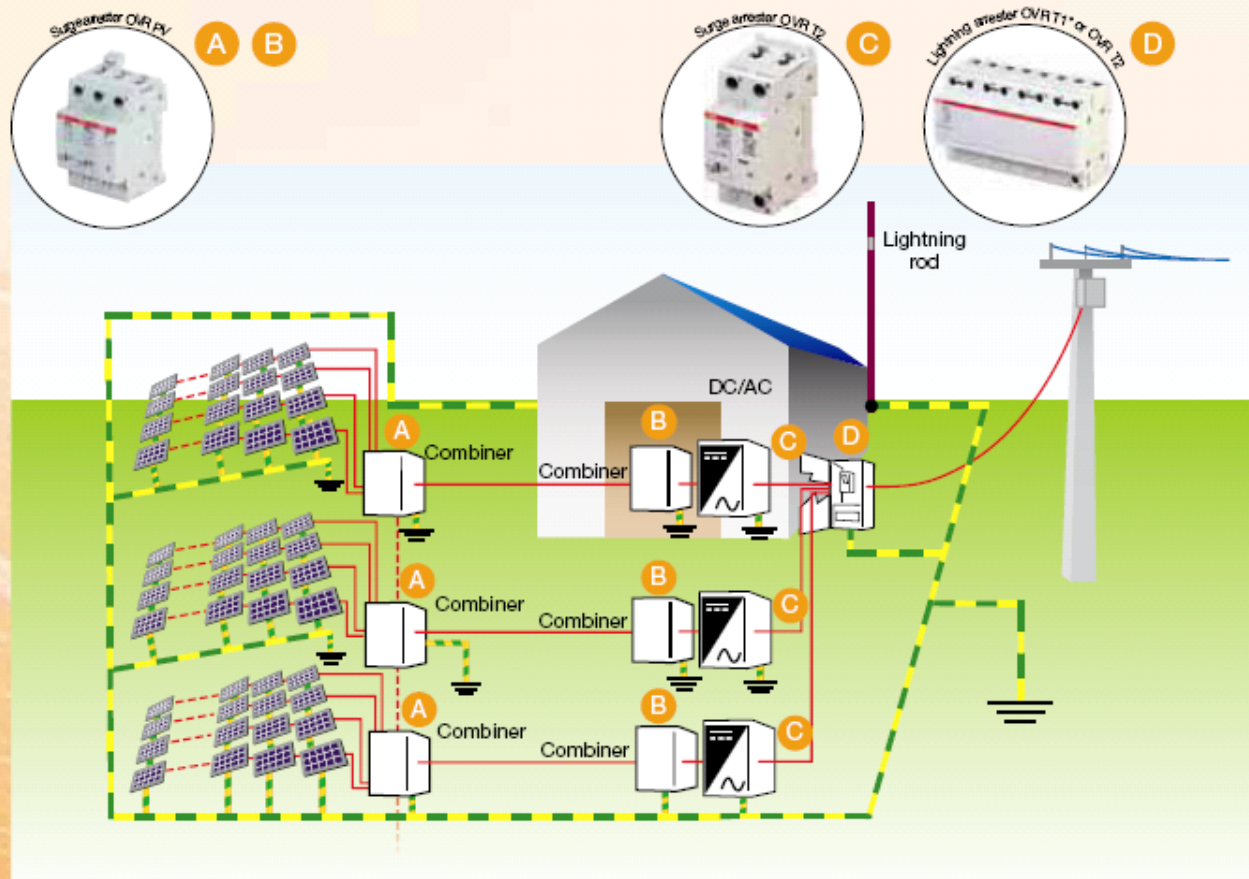
Contactor	Current rating ¹⁾	Voltage	Status
AF580	800 A	850 V DC	Ready to order
AF750	1050 A	850 V DC	Available soon
AF2050	1900 A	850 V DC	Ready to order

1000VDC under test

Transient voltage surge suppressors Lightning and overvoltage protection Up to 1000vdc 70ka

Protection
of connected systems
for power plant

Power plant application



Example of typical installation

*: OVR T1 mandatory in a presence of a lightning rod.

Transient voltage surge suppressors Lightning and overvoltage protection Up to 1000vdc 70ka

Residential/Commercial

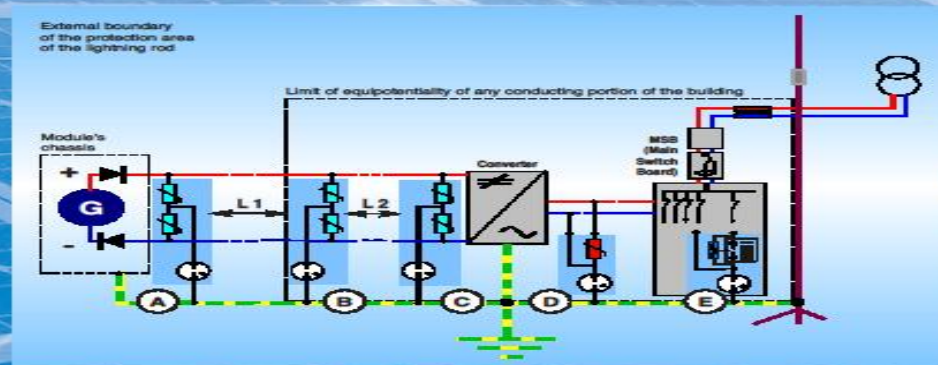
CONNECTED

Protection
of connected systems



Example of a typical installation.

** OVR T1 mandatory in a presence of a lightning rod.



Example of a 500 V installation diagram.

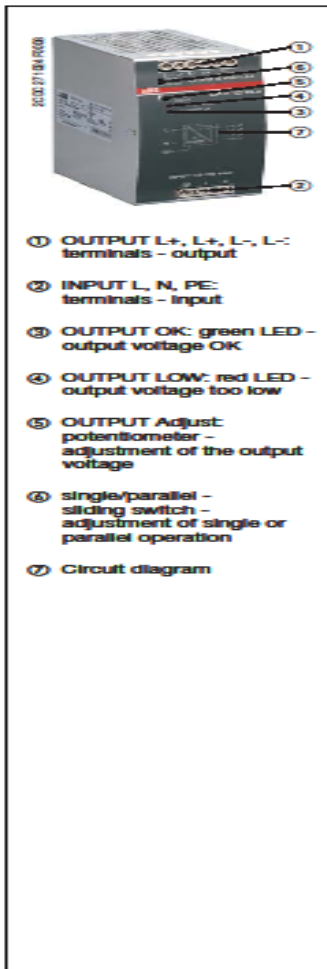
DC power supply

For combiner boxes and inverters

Power supply CP-E 12/10.0

Primary switch mode power supply

Data sheet



Features

- Rated output voltage 12 V DC
- Output voltage adjustable via front-face rotary potentiometer "OUTPUT Adjust"
- Rated output current 10 A
- Rated output power 120 W
- Supply range 115/230 V AC (90-132 V AC, 186-264 V AC, 210-370 V DC), auto select
- Typical efficiency of 84 %
- Low power dissipation and low heating
- Free convection cooling (no forced cooling with ventilators)
- Ambient temperature range during operation -25...+70 °C
- Open-circuit, overload and short-circuit stable
- Integrated Input fuse
- Redundancy unit CP-A RU offering true redundancy, available as accessory
- LEDs for status indication

Approvals

- UL 508, CAN/CSA C22.2 No.14
- UL 60950, CAN/CSA C22.2 No.60950
- GOST

Approval refers to rated input voltage U_{IN}

Approval refers to rated input voltage U_{IN}

Marks

- CE CE
- C C-Tick

pending

Order data

Type	Rated input voltage	Rated output voltage / current	Order code
CP-E 12/10.0	115 / 230 V AC auto select	12 V DC / 10 A	1SVR 427 035 R1000

Order data - Accessories

Type	Description	Order code
CP-A RU	Redundancy unit The CP-A RU provides decoupling of two CP-E power supply units < 48 V and \geq 5 A.	1SVR 427 071 R0000

Application

The primary switch mode power supply offers two voltage input ranges. This enables the supply with AC or DC. Furthermore it is equipped with two generous capacitors, which ensure mains buffering of at least 90 ms (at 230 V AC). That is why the devices can be used worldwide also in high fluctuating networks and battery-powered plants.

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Summary review – ABB Value - Q&A

ABB Value

Compact Size

Benefit

Reduces Real Estate &
Reduces Cost

OEM focus

Benefit

Integrated Solutions
engineered specifically with
the equipment manufacturer
in mind

Simple Installation (Switch &
Accessories)

Benefit

Reduces Total Installation
Time & Reduces Cost

Safety

Benefit

Ultimate Protection of
Machinery & Personnel

Global design platform and support
network

Benefit

Flexibility through Global
Acceptance & Availability

Solar applications quiz

- What does the acronym PV stand for? **Photo Voltaic**
- The E90 Fuse holder is best suited for what common PV application? **String protection**
- Name a common application for a disconnect switch?
String isolation, combiner or inverter disconnecting
- What is the maximum amp rating of the S800PV miniature circuit breaker? **125amps**
- What is the maximum voltage rating of the ABB TVSS surge protection device? **1000vdc**
- The ABB AF Contactor can switch up to 2,050amps, 600V DC. What is the main application?
Controlled switching of the inverter
- What is the main application for the molded case breaker? **Inverter protection**
- The CP-E DC power supply is best suited for supplying power for what devices in combiners and inverters?
String monitors

Reminders

Automation & Power World 2011

- Please be sure to complete the workshop evaluation
- Professional Development Hours (PDHs) and Continuing Education Credits (CEUs):
 - You will receive a link via e-mail to print certificates for all the workshops you have attended during Automation & Power World 2011.
 - **BE SURE YOU HAVE YOUR BADGE SCANNED** for each workshop you attend. If you do not have your badge scanned you will not be able to obtain PDHs or CEUs.

Power and productivity
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